

REMARKS

Claims 1-6 and 9-10 remain pending in this application with claims 1 and 9 being independent claims.

35 U.S.C. § 103 Rejection

Claims 1-4 and 6 were rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,685,830 issued to Bonutti (“Bonutti”) in view of U.S. Patent No. 5,888,213 issued to Sears et al (“Sears”). Claims 9-10 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Bonutti in view of Sears, along with U.S. Patent No. 5,888,212 issued to Petrofsky et al. (“Petrofsky”). Claim 5 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Bonutti in view of Sears, along with Petrofsky, and further in view of U.S. Patent No. 6,821,259 issued to Rahman et al. (“Rahman”).

Amended independent claims 1 and 9 require, among other things, a brace having a length that traverses a joint of a person, a sensor adapted to be coupled to at least one muscle of the person and sensing an electromyographic signal and a processor having program code for implementing a control algorithm that causes an actuator to provide, to the brace, asymmetrical forces, specifically, a force in a first direction having a magnitude which is proportional to a magnitude of the sensor signal and in a second direction a spring return force.

Bonutti discloses an adjustable orthosis that includes a first arm with a cuff and a second arm with a cuff and an actuator connected to the arms to apply force to the arms to pivot them relative to each other to move the joint. The actuator includes flexible force transmitting member connected with at least one of the arms. Bonutti does not disclose, teach or suggest a sensor that senses an electromyographic signal and a processor that includes program code for implementing a control algorithm that causes an actuator to provide, to the brace, a force in a first direction having a magnitude which is proportional to a magnitude of the sensor signal and in a second direction a spring return force.

The Examiner maintains his position that Bonutti discloses a sensor coupled to muscles and cites Fig. 10 and at col. 10, lines 17-19 in support thereof. Office action dated July 27, 2006 at 2. In addition, the Examiner maintains that Bonutti discloses a processor that causes “the

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actuator to provide a force to the brace in a first direction having a magnitude which is proportional to a magnitude of the sensor signal and in a second direction a spring return force (is intended use) that the prior art is capable of performing.” *Id.* However, the Examiner appears to concede that the sensor of Bonutti may not detect an electromyographic signal and the actuator may not provide a force to the brace in a first direction having a magnitude which is proportional to a magnitude of the sensor signal and in a second direction a spring return force, but claims that Sears discloses those elements. *See, e.g., id.* at 3.

Sears discloses a controller for a powered prosthetic limb device, or similar type of extension device, which operates a tactile force feedback system for translating a sensed *pressure force* from the device contacting an object or surface into a tactile sensory feedback *pressure force* to the user via a tip member that contacts and slightly depresses a user’s skin. *See, e.g.,* col. 4, lines 20-27 and col. 8, lines 40-44. The tactile force feedback system includes at least one contact-responsive transducer to translate a sensed *contact pressure* from a portion of the extension device into a proportional tactile pressure force that the tip member applies to the user’s skin. *See, e.g.,* col. 7, lines 19-26 and col. 8, lines 44-47. The contact responsive transducer may be placed on a surface of the gripping member so that the pressure force applied to an object or surface is sensed. *See, e.g.,* col. 5, lines 8-23.

The Examiner appears to suggest that the *pressure* sensor of Sears provides the “sensor adapted to be coupled to at least one muscle of the person . . . , said sensor senses an electromyographic signal of muscles associated with motion of the body part” as required by claims 1 and 9. However, the pressure sensor of Sears located on a *prosthetic gripping member* which senses a *pressure force* is not a sensor that senses an electromyographic signal nor a sensor adapted to be coupled to a muscle of the person.

In addition, the Examiner claims that the actuator provides “a torque (a force) in one direction based on the signal and a return force in an opposite direction based on no signal being received.” Office action dated July 27, 2006 at 3. However, claims 1 and 9 require that the actuator provides “a force to the brace in a first direction having a magnitude which is proportional to a magnitude of the sensor signal and in a second direction a spring return force, such forces causing motion of the body part with respect to the joint.” Sears does not disclose, teach or suggest that the forces are applied to a brace, the brace having a length that traverses a

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joint of a person, or that the forces cause motion of the body part with respect to the joint, but rather discloses applying a pressure force on the user's skin that is proportional to the sensed contact pressure from the device. Also, Sears does not disclose, teach or suggest an actuator that provides "...a return force in an opposite direction based on no signal being received," but rather discloses that in the absence of a sensed contact pressure, no driving force is present to cause the tip member to press upon the user's skin. "The tendency of *the user's skin* to return to a non-depressed position" thus causes the tip member to be removed from the user's skin, not through any action of an actuator. See, e.g., col. 8, line 58-col. 9, line 4 and lines 44-51. Thus, Sears does not disclose, teach or suggest a sensor that senses an electromyographic signal and a processor that includes program code for implementing a control algorithm that causes an actuator to provide, to the brace, a force in a first direction having a magnitude which is proportional to a magnitude of the sensor signal and in a second direction a spring return force.

Petrofsky discloses a computer controlled hydraulic resistance device having an hydraulic actuator and a solenoid actuated valve connected to control the flow of hydraulic fluid to and from the hydraulic actuator which applies resistance to the apparatus through a coupling. The device senses the position of the apparatus and feedsback to a micro-controller for applying a resistance profile to the apparatus. Petrofsky discloses weight force sensors and fluid pressure sensors, but does not disclose, teach or suggest a sensor that senses an electromyographic signal. See, e.g., col. 10, lines 38-62. In addition, Petrofsky does not disclose, teach or suggest a processor that includes program code for implementing a control algorithm that causes an actuator to provide, to the brace, a force in a first direction having a magnitude which is proportional to a magnitude of the sensor signal and in a second direction a spring return force.

The Examiner suggests, once again, that a processor that causes an actuator to provide asymmetrical forces is an intended use "that the prior art is capable of performing." Office action dated July 27, 2006 at 2; See also, Office action dated January 9, 2006 at 5; Office action dated April 6, 2006 at 3. Although the Applicants strongly disagree with the Examiner's position, claims 1 and 9 have been amended to include a processor that includes program code for implementing a control algorithm that causes the actuator to provide a force to the brace in a first direction having a magnitude which is proportional to a magnitude of the sensor signal and in a second direction a spring return force, such forces causing motion of the body part with

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respect to the joint. Thus, for at least the reasons stated above, claims 1 and 9 are patentable over Bonutti, Sears, and Petrofsky, because none of these references, either alone or in combination, shows or suggests a sensor adapted to be coupled to at least one muscle of the person and sensing an electromyographic signal and a processor having program code for implementing a control algorithm that causes an actuator to provide, to the brace, asymmetrical forces, namely, a force in a first direction having a magnitude which is proportional to a magnitude of the sensor signal and in a second direction a spring return force. Accordingly, claims 1 and 9, and the claims depend therefrom, should be allowed.

CONCLUSION

All the claim rejections have been addressed and all of the pending claims are allowable for the reasons stated and others. Reconsideration of the application and issuance of a notice of allowance are respectfully requested. Applicants believes that no additional fees or an extension of time is required. Please apply any additional charges or credits to Deposit Account No.

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Respectfully submitted,



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